

THE UNIVERSITY OF TEXAS AT AUSTIN

## RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name: Okuno, Ryosuke EID: ro859 Present Rank: Assistant Professor

Years of Academic Service (Include AY 2017-18 in each count):

At UT Austin since: 9/1/2015 (month/day/year) Total Years at UT Austin: 3In Present Rank since: 9/1/2015 (month/day/year) Total Years in Present Rank: 3

Tenure-track only:

Number of Years in Probationary Status: 3Additional information: AcceleratedPrimary Department: Petroleum and Geosystems EngineeringCollege/School: Engineering, Cockrell School ofJoint Department: N/ACollege/School: N/AOther Department(s): N/ARecommendation actions<sup>1</sup>:By Budget Council/Executive Committee: PromoteVote<sup>2</sup> for promotion 8; Against 1; Abstain 1; Absent 0; Ineligible to vote 1By Department Chair: PromoteBy College/School Advisory Committee: PromoteVote<sup>2</sup> for promotion 7; Against 0; Abstain 0; Absent 0; Ineligible to vote 0By Dean: PromoteAdministrative Action: Promote to Associate ProfessorDate Action Effective: September 1, 2018

(To be submitted to the Board of Regents as part of the annual budget.)

By: Mauri M. Smith Date: February 15, 2018  
For the President<sup>1</sup> See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels.<sup>2</sup> Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members. The number of committee members ineligible to vote should also be recorded. Enter zero where it would otherwise be blank.

EVPP/4.15





The University of Texas at Austin

**Cockrell School of Engineering****Dean's Assessment****Ryosuke Okuno**Hildebrand Department of Petroleum and Geosystems Engineering  
Cockrell School of Engineering

Dr. Ryosuke Okuno received his BE and his ME in geosystems engineering from the University of Tokyo (Japan) in 1998 and 2000, respectively. After completing his MS, he worked for five years at Japan Petroleum Exploration Co. (JAPEX). He received his PhD in Petroleum and Geosystems Engineering from the University of Texas at Austin in 2009<sup>1</sup>. After completing his Ph.D., he returned to JAPEX for one year before joining the faculty at the University of Alberta (Canada) as an assistant professor in the School of Mining and Petroleum Engineering in September 2010. Dr. Okuno joined the faculty in the Hildebrand Department of Petroleum and Geosystems Engineering (PGE) at the University of Texas at Austin in September 2015.

If promoted to associate professor in September 2018, Dr. Okuno will have accumulated three years of probationary service at UT and a total of eight years in rank as an assistant professor. While this case is considered to be accelerated when considering only Dr. Okuno's time at UT, his total time in rank exceeds our normal timeline.

Dr. Okuno's research focuses on developing methods to improve oil recovery in conventional and unconventional reservoir systems. He develops computational models based on thermodynamics and interfacial mass transfer to represent the multiphase behavior of petroleum fluids in porous media and he conducts experiments to understand complex fluid systems under high-temperature and high-pressure conditions. Within the Hildebrand Department of Petroleum and Geosystems Engineering, his work contributes to six of the twelve primary research areas: geologic carbon storage; enhanced oil recovery; reservoir engineering; unconventional resources; petrophysics and pore scale processes; and reservoir simulation.

Eight external letters were submitted as part of the promotion dossier, with two letter writers recommended by Dr. Okuno and six selected by the budget council. All letter writers are faculty at US institutions: Penn State<sup>2</sup>, Pittsburgh, Rice, Stanford, Texas A&M, University of Southern California (USC) and Utah. Two of the letter writers are members of the National Academy of Engineering (NAE).

Letters were solicited from seven additional external reviewers. Three declined due to personal commitments and/or lack of familiarity with Dr. Okuno's area of research. Four potential international reviewers did not respond to the request.

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<sup>1</sup> Russell T. Johns (now chair of the Petroleum and Natural Gas Engineering Program at Penn State) and Kamy Sepehrnoori co-supervised Dr. Okuno during his graduate studies at UT.

<sup>2</sup> Sanjay Srinivasan (now head of the Department of Energy and Mineral Engineering at Penn State) was on the faculty in PGE while Dr. Okuno was a graduate student. However, Dr. Okuno did not take a course from Dr. Srinivasan and Dr. Srinivasan was not a member of his doctoral committee.

Teaching

While in rank at UT, Dr. Okuno has taught one undergraduate course and one graduate course:

- PGE 427, *Properties of Petroleum Fluids*  
Required undergraduate course  
Taught two times (average enrollment of 30 students)  
Instructor ratings: 4.4 | Course ratings: 3.8 to 4.2
- PGE 384, *Advanced Thermodynamics and Phase Behavior*  
Graduate elective  
Taught two times (average enrollment of 18 students)  
Instructor ratings: 3.8 to 3.9 | Course ratings: 3.7 to 4.0

Dr. Okuno's instructor ratings at the undergraduate level are above the median (4.3) for both the department and the Cockrell School. However, his instructor ratings at the graduate level are considerably below the median within the department (4.3), and correspond to the lowest 15% of graduate courses taught by tenured and tenure-track faculty within the school. Review of the student comments indicates that the low ratings are likely related to the workload. One student commented, "This was the heaviest workload I have experienced to date (3 years here)... I don't know how anyone can keep up."

Gary Pope conducted peer evaluations during two of Dr. Okuno's lectures in PGE 384 during the 2016 spring semester. He noted, "*Thermodynamics and Phase Behavior* is one of the most abstract and difficult subjects we teach in Petroleum Engineering," but he did not provide any suggestions for improving the course.

CIS data from PGE 384 between spring 2007 and spring 2017 are summarized below. Dr. Okuno's ratings are slightly below the historical averages (4.0 instructor | 4.0 course), but appear to be reasonable given the course content.

Spring	Instructor	Instructor Rating	Course Rating
2007	Gary Pope	3.1	3.4
2008	Russell Johns	4.4	4.4
2009	David DiCarlo	3.9	3.9
2010	Russell Johns	4.1	3.8
2011	David DiCarlo	4.0	4.0
2012	David DiCarlo	4.3	3.9
2013	Gary Pope	4.2	4.0
2014	David DiCarlo	4.1	4.1
2015	David DiCarlo	4.7	4.3
2016	Ryosuke Okuno	3.8	4.0
2017	Ryosuke Okuno	3.9	3.7

Dr. Okuno taught fourteen classes (four distinct courses) as a faculty member at Alberta. His average instructor rating was 4.0 (on a 5-pt scale) in both undergraduate and graduate courses.

### Research

Dr. Okuno's research focus is related to the thermodynamic characterization of petroleum reservoir fluids used in enhanced oil recovery. Specifically, he characterizes phase behavior of solvent, oil, and water mixtures and develops computationally robust algorithms for simulating these phase properties. While his research was initially a mix of theoretical and computational work, he has recently developed unique experimental capabilities that complement his theoretical and computational activities. Highlights of Dr. Okuno's research accomplishments include:

- 22 archival journal publications in rank<sup>3</sup> (24 career total). He published 19 journal papers in rank with his graduate students.
- Many of his publications are in top journals in his field including *Fuel* (IF=4.6), *Industrial and Engineering Chemistry Research* (2.8), *Fluid Phase Equilibria* (2.5), and *SPE<sup>4</sup> Journal* (2.2).
- Filed 1 US patent application in rank.
- An h-index of 11 (Google Scholar) with 423 citations.

Since joining UT, Dr. Okuno has received four external research grants totaling \$440,000. He is the sole PI on grants from Japan Petroleum Exploration, Japan Canada Oil Sands, and two joint industry projects that senior faculty in the department direct<sup>5</sup>. Three additional grants/contracts are in the final stages of negotiations. Dr. Okuno is the PI on all three, and Larry Lake is the co-PI on two. The total research funding pending is \$290,000 (\$270,000 his share).

While at Alberta, Dr. Okuno was the sole PI on five external research grants. He received funding from the Natural Science and Engineering Research Council of Canada (equivalent to NSF in the US), the Canada Foundation for Innovation, Japan Petroleum Exploration, and the Society of Petroleum Engineers. Total funding exceeded \$600,000 (CAD).

Two of the external reviewers gave lukewarm assessments of Dr. Okuno's record of external funding:

- Walter Chapman<sup>6</sup> (Rice) stated, "His research funding level appears good although he has had to essentially start over after moving from the University of Alberta."
- Milind Deo<sup>7</sup> (Utah) indicated, "His funding record is reasonably good... It would have been good to see support from the Department of Energy ... or the National Science Foundation."

Dr. Chapman also wrote, "Dr. Okuno's production of published manuscripts is reasonable for a faculty member at this stage of his career." However, the department chair provided a comprehensive analysis to indicate that Dr. Okuno's publication record exceeds the norms in the field.

All the external reviewers indicated that Dr. Okuno's work was of high quality and recommended promotion.

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<sup>3</sup> Ten at UT (one is in press) and twelve at Alberta.

<sup>4</sup> *Society of Petroleum Engineering*

<sup>5</sup> Kishore Mohanty and Gary Pope direct these joint industry projects.

<sup>6</sup> Department of Chemical and Biomolecular Engineering

<sup>7</sup> Department of Chemical Engineering

Advising and Student Mentoring

At Alberta, Dr. Okuno graduated two PhD and seven MS students (two MS students were co-supervised). Dr. Chapman also expressed concerns that Dr. Okuno worked primarily with MS students at Alberta.

Dr. Okuno has not graduated any graduate students at UT, but a PhD student is scheduled to complete her degree this fall. Dr. Okuno is currently advising six PhD and one MS students. He has also mentored three postdoctoral fellows at UT.

University Service

Dr. Okuno's university service has been focused at the department level at UT, where he has served on a faculty recruiting committee and the graduate admissions committee.

Professional Service

Dr. Okuno is a member of several professional organizations and is an associate editor for the *SPE Journal*. He also served for three years as an associate editor for the *Journal of Natural Gas Science and Engineering* (Elsevier).

Other Evidence of Merit or Recognition

Dr. Okuno received one of six Research Fellowship Awards from the Society of Petroleum Engineers in 2012. The award provides seed funding to new faculty members and recognizes their creative research ideas.

Overall Assessment

In summary, Dr. Okuno is a solid teacher and an outstanding researcher. He is developing important computational models for enhanced oil recovery and he has reestablished his independent research program since moving to UT two years ago. He has been successful in securing research funding from industrial sources, and he has published in the top journals in his field. External referees enthusiastically support his promotion. His record of student advising and mentoring is strong, and his level of service to the university and his professional community is appropriate.

As noted, two external reviewers questioned the sustainability of Dr. Okuno's research funding, but I am not concerned. Many of the faculty in the Hildebrand Department of Petroleum and Geosystems Engineering receive the majority of their research funding from industry. Dr. Okuno has clearly demonstrated an ability to secure industrial funding, despite the global downturn in the oil and gas industry. He also was successful in securing federal funding in Canada.

Overall, I believe that Dr. Okuno's performance meets or exceeds expectations for early promotion to associate professor with tenure in all categories, and I support this case without reservation.



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Sharon L. Wood, Dean  
18 November 2017

**Candidate's Summary of Activities**

(in rank for assistant professor; since last promotion for associate professors)

**Ryosuke Okuno, Ph.D., P.Eng.**

<b>Metric</b>	<b>Value</b>
Peer-reviewed journal publications (in rank and total)	22 / 26
Peer-reviewed conference proceedings (in rank and total)	24 / 29
Number of journal papers in rank with supervised student(s) from UT as co-author	19 (UA) / 2 (UT)
Total citations of all publications (career) from ISI Web of Knowledge	106
h-index (career) from ISI Web of Knowledge	6
Total citations of all publications (career) from Google Scholar or Publish or Perish	382
h-index (career) from Google Scholar or Publish or Perish	11
Total external research funding raised in rank	USD 482,845 + CAD 613,965
Total external research funding raised in rank (candidate's share)	USD 482,845 + CAD 613,965
Total number of external grants/contracts awarded in rank	9
Number of external grants/contracts awarded in rank as PI	7
PhD students completed†	2 (2 sole advisor)
MS students completed†	6 (5 sole advisor)
PhD students in pipeline (as of 09/2017) †	5.5 (5 sole advisor)
MS students in pipeline (as of 09/2017) †	1 (1 sole advisor)
Number of courses taught	18
Total number of students taught in organized courses	595 (501 at UA and 94 at UT)
Average instructor evaluation for UG courses	4.0 at UA and 4.4 at UT
Average instructor evaluation for Grad courses	4.0 at UA and 3.9 at UT
Average course evaluation for UG courses	4.0 at UT
Average course evaluation for Grad courses	3.8 at UT
Number of teaching awards	0
Student organizations advised	2 (SPE student chapter at Univ. of Alberta, and local high school, Sherwood Park, AB, Canada)
Undergraduate researchers supervised	3
Service on journal editorial boards	2 (SPE Journal, and Journal of Natural Gas Science & Engineering)
Number of symposia organized	0

† Count a student as 1.0 if sole supervisor and 0.5 if co-supervised.

**Table 2. Grants and contracts awarded while in rank**

<b>PI Role</b>	<b>Co-investigators</b>	<b>Agency</b>	<b>Grand Total</b>	<b>Okuno's Share</b>	<b>Grant Period</b>	<b>Institution</b>
1 "Enhanced Oil Recovery"						
PI	None	Japan Petroleum Exploration	\$115,878	\$115,878	09/01/15-8/31/17	UT Austin
2 "Bitumen Recovery"						
PI	None	Japan Canada Oil Sands	\$76,967	\$76,967	09/01/15-06/30/17	UT Austin
3 "Minimum Miscibility Estimation for Multiphase Oil Displacement by Solvent"*						
PI	None	Gas Enhanced Oil Recovery JIP – Various Donors (K.K. Mohanty, PI)	\$100,000	\$100,000	09/01/15-08/31/17	UT Austin
4 "Alkaline Solvent for SAGD and CSS"*						
PI	None	Chemical Enhanced Oil Recovery JIP – Various Donors (G.A. Pope, PI)	\$150,000	\$150,000	06/01/16-05/31/18	UT Austin
5 "Infrastructure for Phase Behavior Studies at High Temperature-Pressure Conditions"						
PI	None	Canada Foundation for Innovation	C\$149,745	C\$149,745	04/01/15-08/31/15	Univ. of Alberta
6 "Thermodynamic Modeling of Water/Hydrocarbon Mixtures for Thermal Oil Recovery Simulation"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$140,750	C\$140,750	09/01/14-08/31/15	Univ. of Alberta
7 "Modeling of Heavy-Oil Displacement Using the Solvent-Rich Liquid Phase in Solvent SAGD"						
PI	None	Japan Petroleum Exploration	C\$203,470	C\$203,470	09/01/12-08/31/15	Univ. of Alberta
8 "Modeling of Multiphase Behavior using an EOS for Solvent-SAGD Simulation"						
PI	None	Society of Petroleum Engineers	\$40,000	\$40,000	09/01/12-08/31/14	Univ. of Alberta
9 "Numerical Modeling for Improved Steam-Assisted Gravity Drainage"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$120,000	C\$120,000	04/01/12-08/31/15	Univ. of Alberta
		<b>Subtotal Okuno's share</b>		US\$482,845 + C\$ 613,965		

\* These grants were awarded to me out of the larger JIP projects run by Dr. Kishore Mohanty (No. 3) and Dr. Gary Pope (No. 4). I gave research presentations to their annual meetings, and the proposals were evaluated and approved by the JIP members and PI's.



**Table 3. Forthcoming grants and contracts**

<b>PI Role</b>	<b>Co-investigators</b>	<b>Agency</b>	<b>Grand Total</b>	<b>Okuno's Share</b>	<b>Grant Period</b>	<b>Status</b>
1 "Solvent-Assisted Smart Water Flooding for High-Temperature/High-Salinity Carbonate Reservoirs"						
PI	Co-PI Lake, L.W.	Saudi Aramco	\$199,000	\$187,780	09/01/17-08/31/18	Contract being finalized
2 "Fluid Characterization for CO <sub>2</sub> Flooding"						
PI	None	JX Nippon Oil & Gas Exploration	\$10,251	\$10,251	09/01/17-08/31/18	Contract being finalized
3 "PVT Laboratory Study"						
PI	Co-PI Lake, L.W.	Occidental Petroleum	\$80,000	\$68,780	09/01/17-03/31/18	Awaiting for installment
<b>Subtotal Okuno's share</b>			<b>\$289,251</b>	<b>\$266,811</b>		

**Publications**

I have published 22 papers in rank (20 published and 2 accepted) in 8 different journals, out of which 11 papers are in *SPE Journal*. *SPE Journal* has been the most reputable journal in petroleum engineering for fundamental research papers for years. I published 11 papers in rank (15 in total) in this Journal because the majority of my publications are concerned with fundamentals of petroleum engineering. Also, many of my papers were presented first at SPE conferences, and then enhanced/submitted for journal publications. SPE conferences have a "no paper, no podium" policy. It is the most natural process to submit an enhanced version of the conference paper to one of SPE journals, such as *SPE Journal* and *SPE Reservoir Evaluation & Engineering*. Although journals under SPE usually have impact factors below 2.0, their actual impact in the petroleum industry is crucial for dissemination of our knowledge and industrial research funding.

Out of the 22 papers, I am the corresponding author for 20 papers (also the first author for 3 of them), and am the sole supervisor for 15 papers. The first Ph.D. student under my sole supervision, Dr. Ashutosh Kumar, produced 6 journal publications in 5 different journals with the total impact factor of 16.73. My first MS student (Mohsen Keshavarz) co-supervised with Dr. Tayfun Babadagli published 3 journal papers in 3 different journals with the total impact factor of 8.24. I am the corresponding author for all papers with Mohsen. These are some examples to demonstrate the training in my research group.

**Vision**

I would categorize my research into two main areas: 1) phase behavior, and 2) enhanced oil recovery (EOR). Since phase behavior is one of the most fundamental subjects in petroleum engineering, it was part of my long-term plan to study several topics of phase behavior with the first group of my students. This is why the majority of the publications made so far are in the area of phase behavior. The ongoing projects in my group at UT Austin are around the intersection of the two areas, concerned with the utilization of phase behavior for EOR. Also, I see my future publications more balanced between experimental and modeling research.

My vision as a researcher at UT Austin is twofold. Firstly, I will continue to develop new knowledge of petroleum phase behavior, with the immediate focuses on heavy-oil/bitumen and on unconventional resources, such as tight oil and shale gas. Secondly, I will develop novel methods of oil/gas recovery by